AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A device for recovering a carrier comprising:

a first signal converter for multiplying a complex carrier caused by a phase error to a digitized passband VSB (vestigial sideband) signal, to provide a baseband VSB signal;

a second signal converter for multiplying a complex value of a frequency to the signal from the first signal converter, to convert the baseband VSB signal into an OQAM (offset quadrature amplitude modulation) signal;

an error estimating part for generating a signal having carrier phase error information by using a real component and an imaginary component of the OQAM signal; and

an oscillator for generating ~~a~~ the complex carrier according to the carrier phase error information.

2. (Original) The device as claimed in claim 1, wherein the error estimating part multiplies the real component and the imaginary component of the OQAM signal.

3. (Original) The device as claimed in claim 1, wherein the error estimating part respectively squares the real component and the imaginary component of the OQAM signal, and calculates a difference of a squared value of the real component and a squared value of the imaginary component.

4. (Original) The device as claimed in claim 1, wherein the error estimating part calculates absolute values of the real component and the imaginary component of the OQAM signal, and calculates a difference of absolute values of the real component and the imaginary component.

5. (Original) The device as claimed in claim 1, wherein the OQAM signal includes a symbol of the VSB signal in either one of the real component and the imaginary component.

6. (Original) The device as claimed in claim 1, wherein the OQAM signal includes no symbol of the VSB signal in neither of the real component and the imaginary component.

7. (Original) The device as claimed in claim 1, wherein the carrier phase error information is a frequency component of timing edges of the signal from the error estimating part.

8. (Currently Amended) A method for recovering a carrier comprising the steps of:

(a) multiplying a digitized passband VSB (vestigial sideband) signal to a complex carrier caused by a phase error to convert the passband VSB signal into a baseband VSB signal;

(b) multiplying a complex value of a frequency to the baseband VSB signal, to convert the baseband VSB signal to an OQAM (offset quadrature amplitude modulation) signal;

(c) generating a signal including carrier phase error information by using a real component and an imaginary component of the OQAM signal; and

(d) generating ~~a~~ the complex carrier according to the carrier phase error information.

9. (Original) The method as claimed in claim 8, wherein the step (c) includes the step of multiplying the real component and the imaginary component of the OQAM signal.

10. (Original) The method as claimed in claim 8, wherein the step (c) includes the step of respectively squaring the real component and the imaginary component of the OQAM signal, and calculating a difference of squares of the real component and the imaginary component.

11. (Original) The method as claimed in claim 8, wherein the step (c) includes the step of respectively calculating absolute values of the real component and the imaginary component of the OQAM signal, and calculating a difference of absolute values of the real component and the imaginary component.

12. (Original) The method as claimed in claim 8, wherein the signal including the carrier phase error information is generated by using the real component and the imaginary component of the OQAM signal either one of which has a symbol of the VSB signal.

13. (Original) The method as claimed in claim 8, wherein the signal including the carrier phase error information is generated by using the OQAM signal having no symbol of the VSB signal.

14. (Currently Amended) A device for recovering a carrier comprising:

a first signal converter for multiplying a complex carrier caused by a phase error to a digitized passband VSB (vestigial sideband) signal, to provide a baseband VSB signal;

a second signal converter for multiplying a complex value of a frequency to the signal from the first signal converter, to convert the baseband VSB signal into an (offset quadrature amplitude modulation) OQAM signal;

an error estimating part for generating a signal having carrier phase error information by using a real component and an imaginary component of the OQAM signal;

a sampling part for sampling a signal from the error estimating part to shift the signal to a DC (direct current) position;

a filter for filtering, and accumulating the signal from the sampling part; and

an oscillator for generating ~~a~~ the complex carrier according to a signal from the filter.

15. (Original) The device as claimed in claim 14, wherein the error estimating part is a multiplier for multiplying the real component and the imaginary component of the OQAM signal.

16. (Original) The device as claimed in claim 14, wherein the error estimating part includes;

a squaring part for respectively squaring the real component and the imaginary component of the OQAM signal, and

a subtractor for calculating a difference of a squared value of the real component and a squared value of the imaginary component.

17. (Original) The device as claimed in claim 14, wherein the error estimating part includes;

an absolute value calculating part for calculating absolute values of the real component and the imaginary component of the OQAM signal, and

a subtractor for calculating a difference of absolute values of the real component and the imaginary component.

18. (Original) The device as claimed in claim 14, wherein the sampling part samples a frequency component of timing edges of a signal from the error estimating part.

19. (Currently Amended) A method for recovering a carrier comprising the steps of:

(a) multiplying a digitized passband VSB (vestigial sideband) signal to a complex carrier caused by a phase error to convert the passband VSB signal into a baseband VSB signal;

(b) multiplying a complex value of a frequency to the baseband VSB signal, to

convert the baseband VSB signal to an (offset quadrature amplitude modulation) OQAM signal;

(c) generating a signal including carrier phase error information by using a real component and an imaginary component of the OQAM signal;

(d) sampling a frequency component only having the carrier phase error information and shifting to a DC (direct current) position; and

(e) generating ~~a~~ the complex carrier according to the sampled frequency component.

20. (Original) The method as claimed in claim 19, wherein the step (c) includes the step of multiplying the real component and the imaginary component of the OQAM signal.

21. (Original) The method as claimed in claim 19, wherein the step (c) includes the step of respectively squaring the real component and the imaginary component of the OQAM signal, and calculating a difference of squares of the real component and the imaginary component.

22. (Original) The method as claimed in claim 19, wherein the step (c) includes the step of respectively calculating absolute values of the real component and the imaginary component of the OQAM signal, and calculating a difference of absolute values of the real component and the imaginary component.